Climate Change and Human Health Literature Portal

National Institute of Environmental Health Sciences

High-resolution spatiotemporal weather models for climate studies

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Abstract:

BACKGROUND: Climate may exert a strong influence on health, in particular on vector-borne infectious diseases whose vectors are intrinsically dependent on their environment. Although critical, linking climate variability to health outcomes is a difficult task. For some diseases in some areas, spatially and temporally explicit surveillance data are available, but comparable climate data usually are not. We utilize spatial models and limited weather observations in Puerto Rico to predict weather throughout the island on a scale compatible with the local dengue surveillance system. RESULTS: We predicted monthly mean maximum temperature, mean minimum temperature, and cumulative precipitation at a resolution of 1,000 meters. Average root mean squared error in cross-validation was 1.24 degrees C for maximum temperature, 1.69 degrees C for minimum temperature, and 62.2 millimeters for precipitation. CONCLUSION: We present a methodology for efficient extrapolation of minimal weather observation data to a more meaningful geographical scale. This analysis will feed downstream studies of climatic effects on dengue transmission in Puerto Rico. Additionally, we utilize conditional simulation so that model error may be robustly passed to future analyses.

Source: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2576170

Resource Description

Exposure : ⊠

weather or climate related pathway by which climate change affects health

 Precipitation, Temperature

 Temperature: Fluctuations

Geographic Feature: ⊠

resource focuses on specific type of geography

 Ocean/Coastal, Tropical

Geographic Location: ⊠

resource focuses on specific location

 Non-United States

 Non-United States: Non-U.S. North America

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Health Impact: ☒

specification of health effect or disease related to climate change exposure

 Infectious Disease

 Infectious Disease: Vectorborne Disease

  Vectorborne Disease: Mosquito-borne Disease

  Mosquito-borne Disease: Dengue

Model/Methodology: ☒

type of model used or methodology development is a focus of resource

 Exposure Change Prediction, Methodology

Resource Type: ☒

format or standard characteristic of resource

 Research Article, Research Article

Timescale: ☒

time period studied

 Short-Term (